

Accepted Manuscript

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PII: S0924-7963(18)30192-1
DOI: doi:[10.1016/j.jmarsys.2018.08.003](https://doi.org/10.1016/j.jmarsys.2018.08.003)
Reference: MARSYS 3112
To appear in: *Journal of Marine Systems*
Received date: 8 June 2018
Revised date: 5 August 2018
Accepted date: 6 August 2018

Please cite this article as: James J. Ruzicka, John H. Steele, Kenneth H. Brink, Dian J. Gifford, Frank Bahr , Understanding large-scale energy flows through end-to-end shelf ecosystems - the importance of physical context. Marsys (2018), doi:[10.1016/j.jmarsys.2018.08.003](https://doi.org/10.1016/j.jmarsys.2018.08.003)

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**Understanding large-scale energy flows through end-to-end shelf ecosystems - the
importance of physical context**

James J Ruzicka¹, John H Steele^{2*}, Kenneth H Brink², Dian J Gifford³, and Frank Bahr²

¹ Cooperative Institute for Marine Resources Studies, Oregon State University, Hatfield Marine Science Center, Newport, OR 97365, USA

² Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA

³ Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882, USA

* Deceased

corresponding author: jim.ruzicka@oregonstate.edu

Keywords: food webs; mathematical models; continental shelves; transport processes; Northern California Current; Gulf of Alaska; Georges Bank; North Sea

Abstract

A major feature distinguishing shelf ecosystems is the physical context defining rates of nutrient import, nutrient recycling, and plankton exchange between the shelf and ocean. To understand the roles of food web structure and physical context in controlling ecosystem dynamics, we applied a standardized end-to-end model platform to four shelf ecosystems: upwelling, downwelling, offshore bank, and semi-enclosed basin. Two-dimensional geometry and a monthly climatological time-scale were used to consider low-frequency, macro-scale dynamics. Comparative analyses of four different food webs within each physical setting tested the null hypothesis that when nutrient input and physical factors are standardized, there are no substantial differences in the productivity of similarly defined guilds within diverse food webs. With a few specific exceptions, physical context played the greater role in defining ecosystem dynamics, especially at lower trophic levels. Exchange between shelf and ocean affected not only nutrient recycling but also trophic transfer efficiencies and the relative importance of pelagic vs. benthic

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